

a very general opinion here, even though we knew that in France especially the development of the submarine and submersible was being very seriously pursued, and that the trials excited the enthusiasm of the public.

Now, however, that we know that our Government is quietly making its own experiments with submersibles built in this country, and that we have an introduction and a chapter in the book under review written by men of such repute as Sir Edmund Fremantle and Sir Edward Reed, in which the writers show that they are fully alive to the progress and to the great possibilities as well as to the present limitations of this new weapon, we can no longer affect to despise the armed and diving boat, but must at least prove, using the best skill we possess, what is possible both in the way of offence by and of defence against so terrible a weapon. Sir Edward Reed, after referring to the difference in density of the two media water and air, goes on as follows :—

“But it is in the face of this initial and enormous difficulty that the aeronauts of to-day have apparently persuaded themselves that they can successfully float their balloon-ship in mid-air and propel it, not only against the rapid tides of the air in which it floats, but also drive it at a good additional speed. When men are to be found capable of committing their fortunes, and even their lives, to navigation of this kind, it is not surprising to find that the far easier problem of navigating the seas beneath the surface has won the attention and the effort of enterprising men. They certainly have chosen, if the humbler, also the more promising and practical field of operation. I doubt not that they have likewise chosen the more fruitful field.”

Passing over a long but interesting chapter on the morality of submarine warfare, we come to one on the mechanism of the submarine which perhaps more than any deals with the numerous scientific problems that arise. One of the troubles of the immersed ship which is not felt on the surface is the terrible effect of a small change in the position of the centre of gravity. For instance :—

“The Nordenfolt boats were certainly not successful in discharging torpedoes, for as a general rule they as nearly as possible stood up vertically on their tails and proceeded to plunge to the bottom stern first on these occasions.”

By allowing the torpedo tube to fill with water immediately after the discharge, this difficulty is reduced, but it is almost wholly removed by the invention of Mr. Drzewiecki, who has contrived a clamp to hold a torpedo securely outside the boat, by which it can be turned in any direction from the inside and then be liberated by the pressure of the moving water. As the torpedo has a density nearly that of water, its liberation does not affect the stability of the ship. It has been tried with success at Cherbourg.

Even though the mechanical problems are perfectly solved of the different stabilities, of propulsion, of air maintenance, of torpedo discharge and of rising and of plunging, but not below the fatal depth, there remains the horrible fact that under water a ship is blind. When at the surface or awash, the bearings of the enemy may be taken from the cupola, and after plunging, the compass or the gyroscope alone remain to give the sense of direction; but a compass is not at its best in such a

position. Various optical tubes and telescopic periscopes are used to get some sort of view when the ship is not far from the surface, but to what extent successfully it is difficult to discover. At any rate, it is satisfactory to know that in this country the problem has been attacked by so able an optical engineer as Sir Howard Grubb.

One of the most disturbing chapters is that on the antidote to submarines. Information as to what has been done quietly in this country as elsewhere is, of course, difficult to obtain, but even though a charge of high explosion fired in the water may damage or destroy a submarine that is near enough, it is impossible to feel that there is any reasonably sure method of defence against this insidious weapon, always on the supposition, of course, that the mechanical and optical problems referred to are solved in even a fairly satisfactory way.

C. V. B.

WOLLEY'S COLLECTION OF BIRDS' EGGS.

Ootheca Wolleyana. An Illustrated Catalogue of the Collection of Birds' Eggs formed by the late John Wolley, jun., M.A., F.Z.S. Edited from the Original Notes by Alfred Newton. Part ii., *Picariæ—Passeres.* (London : R. H. Porter, 1902.)

TO European oologists, the name of John Wolley is both well known and held in great esteem, for not only was he one of our soundest and best ornithologists, especially in the field, but also was one of the first egg collectors who fully realised the extreme importance of securing the identification of the parent bird, of carefully, and if possible indelibly, marking each egg when taken, so as to avoid all risk of error, and of procuring and noting down the fullest possible information respecting each clutch, as well as of collecting a series of specimens to show all the variety of colour, size and shape to which eggs of the same species are subject. Collectors will therefore gladly welcome the present part, which completes the first volume of the “*Ootheca Wolleyana.*”

The first part was published so far back as 1864, but the present part, completing the volume, has been retarded from various causes, though this somewhat long delay cannot be regretted when one realises, from a perusal of the work, how carefully the editor has brought the work up to date.

Wolley commenced the study of natural history at a very early age, and after occupying himself with botany, entomology and the habits of animals generally, he gradually began to pay special attention to oology, until after a trip to Spain in 1845 and a visit to Morocco, where he discovered M. Favier, who afterwards became so well known to ornithologists, he devoted himself chiefly to that branch of science. After his return to England, he several times visited Scotland in order to study birds in the field, especially the rarer species at their breeding places. In 1850, he made an excursion to the Faroes, which had never before been visited by any English naturalist, communicating an account of the ornithology to the British Association. In 1853, he began the work with which his name will always be associated, the investigation of the ornithology of Lapland, of which no

connected account had been published for nearly a century. Guided by geographical considerations, he fixed his headquarters on the banks of the great Muonio River, nearly half-way between the head of the Gulf of Bothnia and the Arctic Ocean, at a little Swedish farm opposite to the Finnish village of Muonioniska, and at once began to explore the country in every direction. These explorations he carried on personally for five summers and three winters, extending them to the Norwegian provinces of Nordland and Finmark, as well as to the western portion of Russian Lapland, not omitting the great lake Enara, which he found to be singularly destitute of bird-life. In all this work, he was greatly aided by a young lad, Ludwig Knoblock, with whom he fortunately fell in immediately on his arrival in the country, and finding him to possess a strong taste for observing natural objects, generally intelligent and, above all, truthful, he took him into his service and by training made him the valuable assistant he proved to be. To his perseverance, naturalists owe the solution, in 1856, of the mystery which had hitherto surrounded the nidification of the Waxwing (*Ampelis garrulus*), sought for as it had been by many travellers and in many countries. Wolley himself was never so fortunate as to see this bird, but the success which rewarded his exertions to obtain the eggs of many until then unknown or little known species can best be realised by those who are well acquainted with the last edition of Hewitson's work on the "Eggs of British Birds," in which so many of the rarities were figured. Wolley took copious notes respecting the various eggs obtained by him or his collectors, which have been most carefully reproduced in the present work, and will be of the greatest interest and use to both cabinet and field naturalists.

In 1858, Wolley, who for years had been carefully studying what was known of the history of the Great Auk (*Alca impennis*), undertook a voyage to Iceland, in company with Prof. Newton, for the purpose of making further investigations. It was assumed that this species was extinct, though no one knew that such was the case or how it had become so. Much information respecting its latter years were obtained, and it was ascertained that the last two living examples were procured at Eldey, on the south-west coast of Iceland, in 1844.

The year following this expedition, Wolley's health began to decline, and his death occurred in 1859 at the early age of thirty-six.

His valuable egg collection passed into the possession of Prof. Newton, who retaining in his service some of Wolley's collectors, has added considerably to it, hence many species are included in the present catalogue which were unknown to Wolley.

Amongst the additional notes from the pen of the editor may be especially noticed those on the nidification of the Nutcracker. Four coloured plates of ninety-seven specimens of eggs are given, which, though excellent reproductions of the various eggs and well illustrating the variation in shape, colour and markings, were, as stated in the introduction, executed some time ago. Four lithographic plates of landscapes also accompany the work, two of which are scenes in Lapland, the third being a view of Eldey, the last home of the Great Auk or

Garefowl, and the fourth a view of the Alkenhorn in Spitsbergen.

Last, but not least, is an excellent memoir of Wolley, with a very good portrait of him and one of his head assistant, Ludwig Matthias Knoblock, the perusal of which will give infinite pleasure to many an oologist.

THE WANDERINGS OF A NATURALIST IN SOUTH AMERICA.

The Great Mountains and Forests of South America.

By Paul Fountain. Pp. 298. (London: Longmans, Green and Co., 1902.) Price 10s. 6d. net.

IT was only a few months ago that we reviewed a book by the same author on "The Great Deserts and Forests of North America." We learn from the introduction to the present volume that it was originally intended to form a second part of that work, but, on the advice of the publishers, it was "amplified" to make a separate book. Unfortunately, the process of expansion does not appear to have been very happily carried out. In several cases, statements are repeated almost in the same words, and the volume is eked out by a quantity of miscellaneous matter that has little relation to the rest of the book. But the love of nature and the keen observation of animal life that procured so warm a welcome for Mr. Fountain's description of the deserts of the United States are not wanting when the scene is changed to the great forests of the south.

It was in 1884 that the author left behind him the region with which he has made us familiar and set out on his travels in the southern continent. It is a misfortune that he has allowed so long a time to elapse before giving his experiences to the world. It was inevitable that after the passage of nearly twenty years regrettable inaccuracies should find their way into his pages, and these seriously diminish the value of the book.

Taking Obydos on the Amazon as his base, he ascended the Rio Trombetas and subsequently the Rio Purus and several of its tributaries in a boat he had purchased in Pará, transferring himself to a bark canoe of his own manufacture when the water was too shallow for the larger vessel. After his return to Obydos, we lose sight of him for a time and then find him making his way through the forest of the upper Xingu valley to Diamantino in Matto Grosso, where he again passes out of view to reappear sporadically in Guiana, Ecuador, Colombia, Peru, Bolivia and Chili, and finally take leave of us at Rio de Janeiro.

The author is at his best in the description of his excursions up the smaller tributaries of the Purus in the twilight of the overarching trees. It was there, especially, that he was able to make a close acquaintance with the "jungle folk" of the Amazonian plain, of whom those who travel by only the more frequented ways know but little. His long experience as hunter and collector stood him in good stead, and the variety of the forms of life that he met with will seem marvellous to many who have passed over much of the same ground. He does not pretend, however, to scientific accuracy in the determination of species of animals; it is in the